AMENDMENTS TO THE SPECIFICATION

Please amend the abstract as follows (a clean copy of the abstract follows on a separate sheet):

REFERENCE VOLTAGE SOURCE, TEMPERATURE SENSOR, TEMPERATURE THRESHOLD DETECTOR, CHIP AND CORRESPONDING SYSTEM

ABSTRACT

The invention relates to an electrical reference voltage source comprising:

- a first electrical current source (PTAT 101) adapted to produce a first current (14) proportional to a temperature; and

- a second electrical current source (CPTAT 102) adapted to produce a second current (15) inversely proportional to the temperature.

According to the invention, the first and second current sources are installed in parallel and the voltage source comprises means (R3) of summating the first and second currents producing a reference current in the summation means generating the reference voltage (VREF) at the terminals of the summation means.

The invention also relates to a temperature sensor, a temperature threshold detector, a chip and a corresponding system.

~~Figure 1~~

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The invention relates to an electrical reference voltage source comprising:

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According to the invention, the first and second current sources are installed in parallel and the voltage source comprises means (R3) of summating the first and second currents producing a reference current in the summation means generating the reference voltage (VREF) at the terminals of the summation means.

The invention also relates to a temperature sensor, a temperature threshold detector, a chip and a corresponding system.

AMENDMENTS TO THE CLAIMS

Please amend claims 3, 6, 8, 9, 11, 12, 14, 16, and 17, such that the status of the claims is as follows:

1. (Original) A bandgap electrical reference voltage source (104) comprising:

- a first electrical current source (PTAT 101) adapted to produce a first current (14) proportional to a temperature within an operating range of the said source; and

- a second electrical current source (CPTAT 102) adapted to produce a second current (15) inversely proportional to the said temperature;

characterised in that the said first and second current sources are installed in parallel, and in that the said voltage source comprises means (R3) of summating the first and second currents producing a reference current in the summation means generating the said reference voltage (VREF) at the terminals of the said summation means.

2. (Original) Electrical voltage source according to claim 1, characterised in that the said summating means comprise at least one first electrical resistance (R3) through which at least part of the said reference current (I4+I5) will pass.

3. (Currently amended) Electrical voltage source according to ~~either of claims 1 or 2~~ claim 1, characterised in that the first current source comprises:

- first current generation means adapted to produce at least one third current (I1, I2) proportional to the said temperature; and

- a first current mirror adapted to produce the said first current (I4) as a function of the said at least one third current (I1, I2).

4. (Original) Electrical voltage source according to claim 3, charcterised in that the said first current generation means comprise:

- at least one first operational amplifier (A1) and at least one transistor (M1, M2) adapted to produce the said at least one third current;

- at least one bias resistance (R1) adapted to adjust the amplitude of the said at least one third current; and

- at least two bipole transistors (Q1, Q2) coupled together such that the voltages between the base and the emitter of the said transistors are related through an equation of the diode junction type dependent on the temperature.

5. (Original) Electrical voltage source according to claim 4, characterised in that the said first current generation means comprise:

- an operational amplifier (A1) among the said at least one first operational amplifier, with first and second inputs;

- a first field effect transistor (M1) adapted to produce a fourth current (I1);

- a second field effect transistor (M2) adapted to produce a fifth current (I2);

- a first bias resistance (R1) adapted to adjust the amplitude of the said fifth current; and

- first and second bipole transistors (Q1, Q2) coupled such that the voltages between the base and the emitter of the said transistors are connected through a diode junction type equation dependent on the temperature, the collectors and bases of the said bipole transistors being connected to a first voltage potential;

the said first, second field effect transistors cooperating with a third field effect transistor (M3) to form the said first current mirror such that the said first current (I4) is a function of the fourth and fifth currents;

the drain of the said first field effect transistor being connected to the said first bipole transistor and the said first input of the operational amplifier;

the drain of the said second field effect transistor being connected to the said second input of the operational amplifier and to a first terminal of the said first bias resistance;

the second terminal of the said first bias resistance being connected to the emitter of the said second bipole transistor; and

the output from the said operational amplifier being connected to each of the grids of the first, second and third field effect transistors.

6. (Currently amended) Electrical voltage source according to ~~any one of claims 1 to 5~~ claim 1, characterised in that the said current source comprises:

- second current generation means adapted to produce at least one sixth current (I3) inversely proportional to the temperature; and

- a second current mirror adapted to produce the said second current (I5) as a function of the said at least one sixth current.

7. (Original) Electrical voltage source according to claim 6, characterised in that the said second current generation means comprise:

- at least one second operational amplifier (A2) and at least one transistor (M5) adapted to produce the said at least one sixth current; and

- at least one bias resistance (R2) adapted to adjust the amplitude of the said at least one sixth current.

8. (Currently amended) Electrical voltage source according to ~~claims 5 and 7~~ claim 7, characterised in that the said second current generation means comprise:

- an operational amplifier among the said at least one second operational amplifier with first and second inputs;

- a fourth field effect transistor (M5) adapted to produce a seventh current (I3); and

- a second bias resistance (R2) adapted to adjust the amplitude of the said seventh current;

the said fourth field effect transistor forming the said second current mirror with a fifth field effect transistor (M4) such that the said second current is a function of the said seventh current;

the drain of the said fourth field effect transistor being connected to the said second input of the operational amplifier and to the first terminal of the said second bias resistance;

the second terminal of the said second bias resistance being connected to the said first voltage potential;

the first input of the said operational amplifier being connected to the emitter of the said first bipole transistor;

the drain of the said first field effect transistor being connected to the first input of the said operational amplifier among the said at least one second operational amplifier; and

the output from the operational amplifier being connected to each of the grids of the fourth and fifth field effect transistors.

9. (Currently amended) Voltage source according to ~~claims 5 and 8~~ claim 8, characterised in that it also comprises:

- a bias source (100) to supply a starter current (ibias) and/or voltage (vbias) to the said first and second current sources and to the said summation means;

- means of starting the said first and second current sources and the said summation means, the said summation means being powered by the said starter voltage.

10. (Original) Voltage source according to claim 9, characterised in that the said starter means comprise sixth, seventh and eighth field effect transistors (M6, M7, M8), the grid of each of the transistors being powered by the said starter voltage and the source of each of the said transistors being powered by a power supply voltage from the said voltage source;

the drain of the said sixth field effect transistor being connected to the drain of the said first field effect transistor;

the drain of the said seventh field effect transistor being connected to the drain of the said second field effect transistor; and

the drain of the said eighth field effect transistor being connected to the drains of the said third and fifth field effect transistors.

11. (Currently amended) Electrical voltage source according to ~~any one of claims 1 to 10~~ claim 1, charcterised in that a variation of the said second current as a function of the said temperature compensates for a variation of the said first current as a function of the said temperature, such that the said reference current is independent of the said temperature.

12. (Currently amended) Electrical voltage source according to ~~any one of claims 1 to 11~~ claim 1, characterised in that a variation of the said second current as a function of the said temperature does not compensate for a variation of the said first current as a function of the said temperature, such that the said reference current does not depend on the said temperature.

13. (Original) Electrical voltage source according to claim 12, characterised in that a variation in the said reference current is proportional to a variation in the said temperature.

14. (Currently amended) Temperature sensor and/or temperature threshold detector comprising an electrical voltage source (500) according to ~~any either of claims 12 or 13~~ claim 12, characterised in that the said temperature sensor and/or the said temperature threshold detector also comprise means (501) of measuring the said reference voltage (VTEMP).

15. (Original) Temperature sensor and/or temperature threshold detector according to claim 14, characterised in that the said temperature sensor and/or the said temperature threshold detector also comprise:

- means of generating a voltage (VREF) independent of the said temperature within the said operating range; and

- means (501) of comparison of the said reference voltage and the said voltage independent of the temperature.

16. (Currently amended) Electronic chip comprising a voltage source according to ~~any one of claims 1 to 13~~ claim 1.

17. (Currently amended) System comprising a voltage source according to ~~any one of claims 1 to 13~~ claim 1 and an electronic device powered by the said voltage source.

18. (Original) System according to claim 17, characterised in that the said device belongs to the group comprising:

- analogue/digital and/or digital/analogue converters;
- microprocessor cards;
-radio-telephones;
- battery charge regulation circuits;
- electronic devices dedicated to vehicles;
- temperature sensors;
- electrical power supply supervisors;
- digital/analogue and/or analogue/digital conversion devices;
- reset circuits;
- electronic devices dedicated to spacecraft;
- electronic devices dedicated to military vehicles; and
- audio or audiovisual devices.

REMARKS

This Preliminary Amendment is submitted for entry in the above-identified application prior to an Examiner undertaking a first Action in connection therewith. The Preliminary Amendment eliminates multiple dependencies, thus reducing the claim fee owed. The application is now in condition for examination. The Examiner is invited to contact the undersigned at the telephone number listed below if such a call would in any way facilitate examination.

The Commissioner is authorized to charge any additional fees associated with this paper or credit any overpayment to Deposit Account No. 11-0982.

Respectfully submitted,

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